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PAPERS

IN

AGRICULTURE.

The **Gold Medal**, *the Premium offered in Class 44, was this Session adjudged to Major* **Bryan Hesleden**, *of Horton, in Ribblesdale, Yorkshire, for improving upwards of 177 Acres of Waste Land. The following Communications were received from him.*

SIR,

I beg leave to lay before the Society of Arts, &c. an account of having reclaimed and improved a certain tract of land, containing 177 A. 0 R. 9 P. statute measure, in the parish of Horton, near Settle, Yorkshire, called Horton Scar, which, previous to the undertaking in 1806, was a Waste entirely uncultivated, and in a great measure useless; with a description of the mode resorted to, and expenses attending thereon.

I have the honour to remain, the Society's
most obedient humble Servant,

BRYAN HESLEDEN.

To C. Taylor, M. D. Sec.

The soil consists of three kinds, though the greater part is composed of peat earth, retaining water in such a degree as occasionally to approach the nature of a bog, and covered with a thick, or deep heath, but in parts where the land was tolerably dry the heath was not quite so thick; the soil bordering that which was peat earth was composed of light-coloured clay, mixed with a sort of marl, and adjoining that, a small quantity of red loamy soil, both of which being also covered more or less with heath, or dry, poor and coarse bent or rushes. The peat earth was in some places black, in others of a dark-brown colour, twelve inches in thickness, the next stratum or subsoil consisted of a layer of gravel mixed with a kind of red clay, forming a substance of fifteen inches in thickness, so solid as completely to prevent the water from sinking from the surface, soil, or peat earth;—next below this was a firm clay.

Since a great object towards the reclaiming land of this description is, in the first place, to take the water from off the surface by a moderate degree of draining, (though it has been observed, that peat earth may in some cases be made too dry or hard by cutting a superabundance of drains), in this instance drains were carried at different distances from each other, according to the quantity of water or moisture which appeared to lodge in the surface soil, from eight to twelve yards, asunder:—Each drain was cut to the depth of thirty inches, being three or four inches into the clay, which was of so solid a nature as to obviate the necessity of flagging the drain in the bottom (a practice which should invariably be adopted when the turf, or gravel, is not cut through); the breadth of the drains is eighteen inches, walled with stones on both sides, forming a sough, or course of six inches wide and eight high, covering it with a flat stone;

on level ground, filling them up to the top sod with stones; and if on sloping ground, filling them to the top sod on the higher side only, so as to catch the water in its descent. The main or leading drains were made three, and, in some cases, four feet deep, leaving the sough eight inches wide and ten high; the most heathy parts were then either pared or ploughed, turning the sod the upper side down, laying or bedding them again as level as possible, then sown with hay or grass seeds in the Spring of the year, before the turf got too much dryed or scortched by the sun, in the proportion of ten bushels to an acre; the whole was then covered with lime, laid on, as to quantity, in the proportion to the hardness of the land, in loads (one load containing three bushels) at the distance of eight yards square from each other on an average; the lime caused these sods, without any other assistance, to rot, or decay, in the space of three years, and in two years more, to combine again in such a manner as to form a fine green sward, producing the most fattening grass. That part bordering on the peat earth, and consisting of a light-coloured clayey soil with a mixture of marl, as also that composed of a red loamy soil, where in the like manner drained, wherever the least wet appeared, spreading the clay, marl, and red soil that remained, (after filling the drains) on the surface which contributed materially to assist the lime in destroying the heath and rough bent, &c. &c.; a greater quantity of lime was laid on those parts, namely, the loads at the distance of seven yards from each other, and where the land was perfectly dry without the necessity of draining, at six, and occasionally five yards; this quantity spread on the most heathy parts, assisted by the clay and loam, &c. that was taken out of the drains, completely destroyed the heath in five or six years at the furthest, producing the richest grass, and in the end answering as well for pasture as that which had been pared or ploughed, and making a saving of the expense of such process. Notwithstanding the situation of the land in question is very high, yet as it is sheltered from different unfavourable aspects by a variety of rising and falling ground, as also bounded by a wall of six feet in height, and is principally intended for the purpose of grazing of Cattle and Sheep, (the latter in particular having been known from experience to thrive best when they had a tolerable extensive range); for these reasons it was deemed unnecessary to divide it into any more allotments or closes than three, the inner, as well as the outer fences being built of stone, six feet in height, three feet wide at the bottom, and sixteen inches at the top, with two rows of throws or large stones going across the wall, and eighteen of them to each rod in length.

The following is a full account of the expenses attendant on this undertaking:

	£.	s.	d.
3718 rods of draining, at 1s. 3d. each on an average - - - - - -	232	7	6
216 rods of main, or leading drains -	18	18	0
39 acres paring, at 1l. 2s. per acre -	42	18	0
22 acres ploughing, at 1l. 3s. per acre -	25	6	0
Sowing with hay seeds, 10 bushels to an acre	12	3	4
15,495 loads of lime, at 7½d. per load - -	484	4	4½
Carting of ditto, at 17s. per every 100 load	131	14	1¾
Spreading of ditto, at 3s. per ditto - -	23	4	10
Walling 454 rods of stone fence, at 7s. per rod - - - - - - -	158	18	0
Total	£1,129	14	2¼

This money has been expended in the course of the last six years with the greatest œconomy and attention, at the rate of 188*l* 5*s.* 8*d.* on an average annually, intending it, as has been before observed, for the purpose of fattening cattle. Even when it is desirable that land of this description should be occupied in tillage, it will be necessary to adopt the same measures, such as draining, ploughing or paring, and limeing more or less, &c. in the first instance.

Subjoined is a statement of the number of cattle and sheep fattened and sold to the butcher in the course of the last summer, namely, in 1812, with the sums they respectively yielded of profit.

36 English and Scotch cows and heifers, £3. each - - - -	108	0	0
100 wether sheep, at 17s. each - -	85	0	0
	£ 193	0	0
Deducting 2s. 9d. per acre, the utmost value of the land previous to the improvement - - - -	19	18	3
	£ 173	1	9

Thereby leaving for the money so expended a profit of 15*l.* 3-10ths per cent. The value of the land for the remaining part of the year amply repaying the interest for the capital employed in the purchase of stocks, viz. for cattle and sheep.—Although the profit arising from this ground, so lately a tract of waste, in the space of one summer, is very encouraging, its improvement may be said to be yet in its infancy, as it will undoubtedly continue to increase in value for a number of years to come.

Trusting that this will be sufficient to induce others who have land in a similar condition, to adopt a like system, and confident that there are several very extensive tracts of land, of trifling value to the owners at present, in the Northern Counties, as also some in the Southern (particularly that of Dartmoor in Devonshire) which might be improved with the greatest advantage to the Proprietor, as well as that of the community, notwithstanding the price of labour might be somewhat higher *, and the materials, such as lime and stone, were double that which has been here stated. Amongst other benefits resulting from the Proprietor employing his capital in this way, the following may be reckoned as deserving attention, from observations the writer has made, and which he begs leave to state, as being deduced not from theory alone, but from practice and observation.

1st, His security is permanent, and with certainty of an increased rent or profit, sooner or later. 2ndly, In proportion to the increased rent or profit he gains, in that ratio does he contribute to the revenue of the state. 3dly, It increases the demand for labour, and augments the rate of wages, thereby tending in a material degree to lessen the amount of the poor rates. 4thly, It encourages industry by affording employment to a class of labourers, some of whom otherwise might remain in idleness, and ultimately give way to beggary, or probably worse habits. 5thly, By draining the moisture from the surface of the land, the air is rendered less impure, consequently the

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* The price of labour is probably as high here as in most other parts, a labourer receiving generally three shillings, or three and sixpence a day, though materials are at a low rate compared with some situations, limestone being dug up in the premises, and coal within two miles distance.

country becomes more healthy. 6thly, Increasing the produce of the earth provides for the sustenance of mankind, an object truly desirable at a time when the increased population appears more than the produce of our land for their necessary support. 7thly, The satisfaction, mixed with the pleasing reflections the owner must feel on viewing groups of cattle and sheep fattening on food he had been himself instrumental in procuring for them, or in observing crops of corn and grass to spring and flourish on places where neither he nor any one else had ever before witnessed any. Lastly, The turning his attention to this object may be a means of keeping the body in health, the mind at ease, and prevent him from giving way to habits much less honourable or praiseworthy.

BRYAN HESLEDEN.

Horton, January 20th, 1813.

To C. TAYLOR, M. D. SEC.

CERTIFICATES.

This is to certify, that Major Bryan Hesleden, of Brackenbottom, in the parish of Horton, in Ribblesdale, and county of York, hath reclaimed and improved three inclosures situate at Horton Scar in the said parish, containing by admeasurement one hundred and seventy acres and upwards—the said three inclosures previous to the improvement consisted entirely of bogs, peat and heath; and from a state of comparative sterility, are now become rich pasturage for the feeding of cattle.—As witness my hand, the 20th of January, 1813.

GEORGE HOLDEN,
Minister of Horton.

This is to certify, that three closes or parcels of ground, belonging to Major Bryan Hesleden, of Brackenbottom, situate on Horton Scar, in the parish of Horton, in Ribblesdale and county of York, containing one hundred and seventy-seven acres and nine perches, have been carefully examined and surveyed by me, and I may aver with propriety, that the said inclosures were either bog, peat or heathy ground, in a great measure useless and unproductive prior to the extraordinary improvement that has lately taken place, but are now in such a state of cultivation as to be properly adapted to the purposes of grazing, &c.

As witness my hand, this 20th day of January, 1813.

J. M. Hodgson,
Land Surveyor.

I certify, that I fed in the course of the summer 1812, on the lands lately improved by Major Hesleden, called Horton Scar Pasture, the following cattle and sheep, which when sold yielded profit on an average as follows:—

16	English cows	-	£48	0	0
20	Scotch heifers	-	60	0	0
100	wether sheep	-	85	0	0
			193	0	0

I calculated the value of the grass for the autumn and winter sufficient to pay the interest of the money laid out in the cattle, &c.

This profit arises solely from the effects of improvements, and it will increase in value for some years to come, by being able to feed a greater number of stock upon it, &c.

Witness my hand,
William Holgate.

Horton, January 20th, 1813.

By information since communicated by Major Hesleden to the Society, from the great improvement of the land, the last season it both with cattle and sheep, yielded to the farmer a much greater profit.

The LESSER GOLD MEDAL *of the Society was this Session voted to* W. C. KNOWLYS, *Esq. of Woods Farm Lodge, near Crawley, in Sussex, for improving 308 Acres of Waste Land. The following Communication was received from him.*

SIR,

I AM encouraged to send to the Society of Arts, &c. a statement of my improvements on the land I have purchased in St. Leonard's Forest and at Slaugham Park, and which I have converted from a wild unprofitable and uncultivated state into a valuable cultivated one, and have also planted upon it above 350.000 trees. The particulars are as follow. In 1804 and 1805, I purchased 308 acres of land of the above description, about three miles from Crawley in Sussex, and thirty three miles from London, on the great road from thence to Brighthelmstone. The land was covered with heath, furze, fern or brake, swamps, pollards and stumps of old birch and beech trees, and part of it was a rabbit warren. The soil is light, rather sandy, with a shrave or thin layer of iron-stone below.

Since my attention to its cultivation the land has been grubbed, pared and burnt, many of the birch and beech pollards cut down, and the rabbit warren destroyed.

The whole is now cleared and inclosed with a quickset hedge, forming a fence of nearly four miles long if placed in a right line. The property is divided into arable, pasture and woodlands, on which I have planted the following trees, viz.

Scotch fir - - - -	80,000
Larch - - - -	80,000
Alder - - - -	50,000
Beech - - - -	50,000
Elm - - - -	15,000
Hazel - - - -	10,000

The rest are limes, oak, ash, hornbeam, chesnut, planes, and other trees, in the whole above 350,000 trees.

The plantations form a belt round the grounds, and in many parts are formed into clumps, comprizing in the whole about eighty acres of wood land, besides the belt. The trees cost about three-pence a-piece, many of them are now five or six years old, and are becoming valuable. They will in a few years amply repay the expense, being in a very thriving state, and very few have died. Sensible of the great importance of manure in all farming operations, I have built a stable for the accommodation of some of the Brighton coaches, who change their horses there, and for which I am paid a fair rent. I have engaged to furnish them with straw and litter in exchange for their manure, which affords me a large annual supply at hand, to the great convenience and benefit of my farm. This saves a great part of the expense of sending fifteen miles, to Claydon Hill, for lime for manure.

I cannot specify in detail the exact and particular statement of the expenses incurred in the clearing, planting, and putting this property into a state of cultivation, as I have not kept a separate account of my purchases, buildings, and other improvements; but I estimate, that in grubbing, clearing, and planting, I have employed ten or twelve men, at fifteen shillings per week each, for above six years, besides my teams of oxen and horses, which have been used for all the purposes requisite for the improvements.

I have built a comfortable villa, with extensive offices, besides barns, outhouses, &c. attached to my farm-yard; also cottages for my workmen, large garden, walls, &c. The land is now inclosed, and in a good state of cultivation, producing wheat, oats, barley, potatoes, carrots, and rotation crops, besides pastures well calculated for sheep, cows, and oxen. The land was not formerly worth more than two shillings and sixpence per acre, but is now worth at least twenty shillings. I have sent Certificates from respectable persons who have seen the ground both in its former and present state, and can testify to the great improvement I have made in this part of the country, than which none wanted it more; and there is now rising in my neighbourhood, with the Honourable Lord Erskine and other gentlemen, a great spirit for planting and cultivating.

If this statement should meet with the countenance and approbation of the Society of Arts, &c. I hope it will induce others to make similar experiments, being fully sensible that country gentlemen cannot better employ their time, either for their amusement or advantage, or to greater benefit for their country, than in cultivating and planting the waste and uncultivated parts of the kingdom. Plantations may be formed in any soil and situation, and they would in time repay the expenses incurred on them, and furnish timber for our naval and domestic purposes.

I have the honour to be, Sir,
Your most obedient humble Servant,
WILLIAM C. KNOWLYS.

Woods Farm Lodge, near Crawley, Sussex,
March 29, 1813.

To C. Taylor, M. D. Sec.

Certificates were received from the Rev. S. J. Lewin, rector of Crawley; Mr. William Lambe, Tilgate House, near Crawley; Mr. John Batchelor, and Mr. Samuel Whapham, both of Slaugham; stating, that they have been, and are well acquainted with the above-mentioned property of Mr. William C. Knowlys, in St. Leonard's Forest and Slaugham Park, near Crawley, in Sussex, both in its former and present state, and believe Mr. Knowlys's statement to be a fair and true account of his improvements.

The LESSER GOLD MEDAL *of the Society was this Session voted to the late* JOHN MAURICE JONES, *Esq. of Chester, for planting* 979,939 *Timber Trees, in North Wales. The following Communications were received from him.*

SIR,

THE national advantages arising from the growth of timber, not only in reference to the supply of that bulwark of our national strength, the Navy, but as its increase would considerably reduce the importation from foreign countries, have of late years much engaged the attention of our great land proprietors; and as they are becoming more correctly appreciated, will be more obviously important. Although our country can boast of numbers of patriotic characters, whose exertions for the public weal are not unfrequently pursued at their own individual inconvenience and loss, yet it is more than can be calculated upon that the operation of this principle will ever extend through the ranks of community. But the planting of timber, especially on lands incapable of any other produce, of which vast tracts are to be found throughout the kingdom, is now ascertained to combine *private benefit* with *public utility*, to associate *individual profit* with *general advantage.*

The principality of Wales, from the amazing quantity of waste lands with which it abounds, fit only for bearing trees, naturally claims particular attention when the rearing of timber is the subject of consideration, and it is to this part of the kingdom my present remarks are intended to apply.

It is a fact beyond contradiction, that the mountains in the principality of Wales are incapable of improvement in any other way than by plantations of hardy trees; and it is equally certain, that in these situations they may be reared to great advantage. One great obstacle to the practice of planting, is, the distant period at which the crop reaches maturity, and promises remuneration. The unenlightened land owner does not so much estimate the future profits of a plantation, as he does the *present* expense and labour of planting; and hence he views the covering his barren wastes with plants, rather as a precarious speculation than a certain good. The Welsh agriculturist may have heard of, or even read, dissertations on the profitableness of the practice, though even in this respect his means of information is much inferior to those of the English; but besides this he wants the stimulus of general example, and the more powerful incentive of practical evidence. Neither of these have been abundantly furnished till of late years. A laudable example has, however, lately animated many land proprietors to benefit themselves and their country. The spirit of planting is roused, and there seems little doubt of its spreading wider and wider, till the principality be provided with a sufficiency of timber to supply its own consumption; and probably at a future period, afford some for exportation.

It is very evident that Wales was, some centuries ago, remarkably well wooded. Its extensive bogs contain the remains of very magnificent trees; no good reason can therefore be assigned for the same sort of trees not thriving in them again, if judiciously managed. The want of wood and shelter in most part of the principality is one of the circumstances which seems to operate most powerfully in the opinion of enlightened agriculturists, and to its disadvantage, in respect of its produce. This paucity of timber is likewise prejudicial to its general appearance.

Such extensive tracts of country as the mountains, in the various districts, without either trees or hedges to diversify the landscape, are certainly not very gratifying to the eye; this sameness is the more to be regretted, because the levels and vallies are far from conveying the idea of barrenness, nor can it be supposed, that nature intended them to be thus naked and unprotected. It is impossible precisely to ascertain the expense of planting per acre, as it must of course vary according to a thousand different cirumstances of soil and local situation; it may, however, be taken generally at from £6 to £8.

After these general remarks, permit me, Sir, to lay before you an account of the number of forest trees I have planted in the counties of Merioneth aud Denbigh, during the years 1809 and 1810; for which I presume to offer myself to the Society, as a candidate for the Medal annually bestowed by that admirable institution.

It is impossible to give any accurate estimate of the value of my mountains, some parts of them being worth from 1s. to 2s. of yearly value per acre, while other parts are not worth a farthing. By inclosing and planting the deep declivities and tops, I have no doubt that the whole might even be raised to the value of 20s. or even 30s. of yearly rent. The present state and value of this land may serve as a specimen of most of the Wastes in Wales, at the same time that it shews to what advantage they might be turned, by industry and care, even in the most remote situations of the principality. In both the districts to which I have alluded, the plantations must also greatly benefit the surrounding vallies as a shelter. For eight months in the year, upon an average, the north west winds prevail, and from this quarter the most furious storms generally blow, the effects of which are very discernible in the appearance of the trees. The soil upon which I have planted is various, but some of it such as is not capable of any other growth, except that of timber; in general it is light and dry, but shallow; part of it rocky and steep, much of it peaty and some mossy. By far the greater part of the district consists of hills: these are partly green, but mostly covered with heath; and the interjacent flats are covered with heath, and rather swampey. Forty bushels of acorns have also been dibbled amongst the trees, and in each county I have formed an extensive nursery, all of which are full of young seedlings. Besides the timber, I have planted above a million of quicksets for hedges and hedge-rows in particular places, which will afford considerable utility and warmth.

I have the honour to be,
Sir,
Your obedient Servant,
JOHN MAURICE JONES.

Chester, January 21st, 1813.

To C. Taylor, M. D. Sec.

Planted from the 1st *of October,* 1809, *to the* 1st *of May,* 1810.

In the County of Merioneth.

	A.	R.	P.
Reval	0	2	0
Caerleon	2	0	9
Cyfty	2	3	0
Dolfriog	46	3	0

In the County of Denbigh.

	A.	R.	P.
Cumddwr	0	30	0
Bwlchy Pare	4	2	0
Gallygannan	37	3	20

Ash	27,467
Beech	29,806
Chesnut (horse)	2,970
——— (Spanish)	1,485
Elm	2,782
Fruit	174
Larch	296,080
Oak	97,942
—— (American)	1,460
—— (Maltese)	79
Poplar, White	1,200
Quicksets	
Scotch fir	495
Silver fir	538
Spruce fir	2,451
Sycamore	12,473
Willow	1,248

From the 1st *of October,* 1810, *to the* 1st *of May,* 1811.

In the County of Merioneth.

Town of Baln	3	3	26
Dolfriog	5	2	0
Cwm Caith	12	1	0

In the County of Denbigh.

Gallygannan	28	2	17

Ash	30,472
Beech	28,427
Chesnut (horse)	1,000
———(Spanish)	5,810
Elm	6,040
Larch	305,600
Oak	82,405
—— American	2,060
Poplar, Black Italian	1,603
Quicksets	
Scotch fir	16,060
Silver fir	16,060
Spruce fir	1,260
Sycamore	10,930
Willow	2,300

N. B. Many thousand more trees have been planted in the hedge-rows.

SIR,

I HAVE enclosed the certificates of my agents, Mr Williams, of Mold, and Mr. David Pritchard; also of my Planters, Thomas Roberts, and Thomas Jones, which I hope will be satisfactory to the Society.

I have the honour to be,
Your obedient servant,
JOHN MAURICE JONES.

Chester, January 26th, 1813.
To C. TAYLOR, M. D. SEC. &c.

This is to certify, that John Maurice Jones, Esq. of the City of Chester, did plant in inclosures, well fenced with good stone walls, or quickset hedges, 972,939 trees, and 277,000 quicksets at Dolfriog, Gallygannan, and other farms, in the Counties of Denbigh and Merioneth, between the 1st of Oct. 1809 and the 1st of May 1811, at proper distances, in a soil that suits their growth, and that they are in a thriving and healthy condition. Forty bushels of acorns have at the same time been dibbled in the plantations, and the hedge-rows every where planted with stout forest trees.

W. WILLIAMS,
Agent to the said J. M. Jones, Esq.

Mold, January 19th, 1813.

This is to certify, that John Maurice Jones, Esq. did plant in Inclosures, well fenced with good stone walls, at Dolfriog, near fifty acres of land, in the county of

Merioneth, between October 1809 and May 1810, at proper distances, in a soil that suits their growth, and that they are now in a thriving and healthy condition.

Bethgelert, Jan. 20, 1813.

The ✕ Mark of THOMAS JONES, Planter.
DAVID PRITCHARD, Innkeeper.

This is to certify, that John Maurice Jones, Esq. did plant in Inclosures, well fenced with good stone walls or quickset hedges, at Dolfriog and Gallygannan, in the counties of Denbigh and Merioneth, between October 1809, and May 1811, at proper distances, in a Soil that suits their growth, and that they are in a thriving and healthy condition.

Llanarmon, January 18*th*, 1813.

THOMAS ROBERTS.

Trees planted - -	972,939
Quicksets - - -	977,000
	1,949,939

The LESSER GOLD MEDAL *of the Society was this Session voted to* PATRICK STEUART, *Esq. of Auchlunkart, in Banffshire, for planting* 380,000 *Larch Trees,* 390,000 *Scotch Firs, and* 10,000 *Birch Trees, in North Britain. The following Communications were received from him.*

SIR,

I BEG leave to offer myself as a candidate for the premium, article 14, offered by the Society of Arts, &c. and should feel highly gratified in obtaining it. I return you my thanks for the ready communication you favoured me with towards enabling me as a planter to present my claim to the Society. I have great pleasure in stating the good condition of the trees, and that I do not entertain the smallest doubt that they will, with very few exceptions, completely fill the ground. I enclose the attestation of John Cuthbert, my gardener, who, between the 1st October 1809, and the 1st April 1810, planted in pits, made the preceding summer, two years old hard wood trees, to the number of 7,000 also 56,000 seedling Scotch firs; few of the pitted plants have failed, as the land was good, but from its steepness and other reasons, incapable of cultivation by the plough. The 56,000 Scotch firs were planted principally for the purpose of filling up plantations made by me a few years before, and most of them have succeeded.

I also inclose a certificate of Mr. Rennie, nurseryman in Aberdeen, who planted for me in the same season 380,000 larches, 390,000 Scotch firs, and 10,000 weeping birch trees, or one hundred and eighty Scotch acres, of land, which had been previously inclosed, and drained where necessary. These plants were two years old seedlings, and are in a healthy thriving state, and will completely stock the ground, excepting in about ten acres of the land most exposed to the north and north-west winds. The land was a dry moor, not worth annually one shilling per acre, and the trees were planted at the distance of four feet from each other, mixing them as well as could be conveniently done. I am very partial to the instrument used for the planting, which is similar to a mason's trowel without the curve. In the winter of 1810—11, I caused above 20,000 one year nursed hard wood trees to be planted out with it, and they are in a very thriving state, but I do not think that with older plants the instrument can be used to advantage. The total number of trees planted here between the 1st October 1809, and 1st of April 1810, were, of

Larch, elm, ash, spruce, beech, &c.	7,000
Seedling larch - - - - -	380,000
Of Scotch firs - - - - -	446,000
Of weeping birch - - - - - -	10,000
Total	843,000

I have the honour to remain,
Sir,
Your most obedient Servant,
PATRICK STEUART.

Auchlunkart, Banffshire,
Dec. 23d, 1812.

To C. Taylor, M. D. Sec.

A certificate from the Rev. Pat. Forbes, minister of Boharm, declared that the above statement is altogether correct.

A certificate from John Cuthbert, dated Auchlunkart, Dec. 19th, 1812, signed before Alex. Cameran, Esq. justice of peace for Banffshire, testified, that in the course of the winter 1809—1810, he had planted for Patrick Steuart Esq. 56,000 Scotch firs, and in pits two years nursed plants consisting of larch, elm, ash, spruce, planes, beech, &c. to the number of 7000, and that they are in a thriving condition.

A certificate from Alex. Rennie, dated Aberdeen, Dec. 25th, 1812, signed before Francis Gordon, Esq. justice of peace, testified, that between October 1st, 1809, and April 1st, 1810, he had planted for Patrick Steuart, Esq. 380,000 larch, 390,000 Scotch firs, and 10,000 weeping birch, all two years old seedlings. That the ground had been inclosed and drained, and the plantation appeared to be last summer in a thriving state.

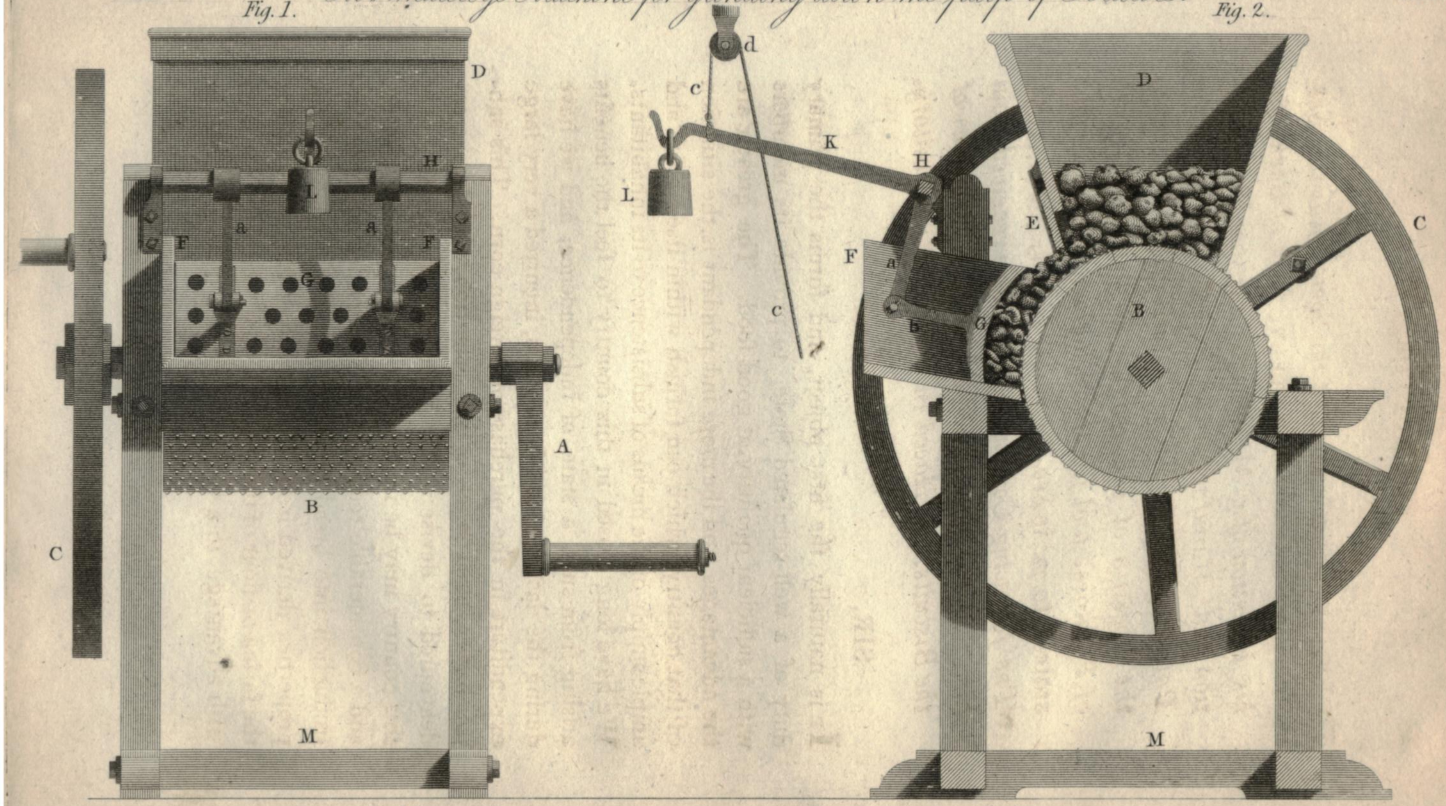
The Lesser Gold Medal *of the Society was this Session voted to* John Whately, *Esq. of Cork, for his Invention of a Machine for the speedy Separation and Manufacture of Farina or Flour from Potatoes, and for various Observations relative to the necessity of encouraging an extended Growth of Potatoes, and for their Applications in various states, to make Sea Biscuits, Bread, Pastry, &c. The following Communications were received from him. A Model of the Machine, and Specimens of the Biscuits, are placed in the Society's Repository.*

SIR,

It is naturally the first object, and forms the primary duty of a well-regulated State, to provide its members with a sufficient quantity of good food. The greater are the advantages, and the more independant is the situation of that country, which can furnish within itself a full and ample supply of the means of subsistence to its inhabitants. We have long ceased in this country to feel the benefits arising from such a state of independence, and we have during the last ten or fifteen years, incurred a very large expenditure in the purchase of foreign corn. This subject has engaged much of my attention, and I have endeavoured to devise a plan by which the agriculture of this country may be improved, a great expenditure saved, and a considerable reduction of prices effected by the introduction into bread of an article of known nutritious properties derived from the potatoe. This substance is the farina or flour of that valuable root, which I have tried with advantage to a very great extent, having previously gone

Mr. Whateley's Machine for grinding down the pulp of Potatoes.

Fig. 1. Fig. 2.



J. Farey delin.

Engraved by J. B. Taylor.

gone through a long course of experiments on making bread, biscuit, and pastry, from mixtures of raw potatoes, and boiled potatoes and farina, with different proportions of flour, &c.

It is well known that poor light soils, unfit for the culture of wheat, and from which only crops of barley or oats have been produced, and of which in many situations there are large tracts of land altogether uncultivated, will produce potatoes of excellent quality; two circumstances have however hitherto prevented their culture to the desirable extent, namely, the great expense of their carriage in a raw state from the interior parts of the country to a proper market, and their not keeping well more than six months after the crop is gathered.

These inconveniences I have obviated by the invention of a machine which is now at the Society's house, by which one individual can grind down fifteen hundred weight or seventeen hundred pounds nett of potatoes, into soft pulp in one day, yielding about two hundred weight of farina or flour when dried.

By calculation the power of a single horse will be equal to the grinding of twenty two tons of potatoes per week; the machine is capable of being applied to any power required. The farina or flour has been known to keep good seventeen years, and it may be afforded so as to yield a fair profit to the farmer, and the manufacturer at three pence per pound. The present price of wheaten flour is about five pence farthing.

It would be tedious now to enter into a long detail of this business by letter, but my son is in London, and if he is permitted to attend a Committee of the Society, and to give proofs of the trials I have made, by exhibiting specimens of the bread, flour and biscuits, and by furnishing such other particulars as may be required, I trust they will perceive the great benefits that may result from this article, and particularly if my communications should merit the sanction of the Society, and be honored with their approbation.

I remain, Sir,
Your most obedient humble Servant,
JOHN WHATELY.

Cork, April 19th, 1813.
To C. Taylor, M. D. Sec:

Remarks from Mr. Whately, on Potatoes.

It may not be generally known, but it is capable of the most satisfactory proof, that the same quantity of land will yield above one half more of farina or flour where potatoes are cultivated, than if the same land was applied to the production of flour from wheat.

I have proved from experiment, that 2619 pounds of pure farina or flour may be produced from an acre of land planted with potatoes, and only 1660 pounds of flour from an acre of wheat. It will therefore be obvious, that, if we can apply this great excess to the same purposes as the flour of wheat, the advantages arising from it will be of the highest importance to the community. We now require from foreign countries about 500,000 quarters of wheat annually, for which we incur an expenditure of about two millions sterling, in ordinary years, and which has increased in years of scarcity to upwards of seven millions sterling, and there seems no probability that under the continuance of the present system of cultivation, we shall ever arrive at the period, when we can supply our own wants, and feel independant of foreign aid, for one of the first articles of subsistence.

We have had, for the last ten years, not only a course of favourable seasons, but the farmer has had, in the greater part of that period, the benefit of high prices to stimulate his exertions to the greatest possible production of corn, and if they have failed under such favourable circumstances to satisfy our wants, what evil may we not expect if the seasons should prove unpropitious, and the inconveniences of our situation aggravated by scarcity? I admit, that the prospect of supplies from foreign countries may be great, but we should recollect, that only a few months have elapsed, since the ports of Europe and America were shut against us, or only open on a system of licence, and that, in a situation of dependance, which, no well-wisher to his country can be desirous to see recur, nor, the possibility of which he will not feel anxious to prevent;—This, then, is one of the advantages which will attend the consumption of potatoe flour in bread, the earth yields it so much more abundantly, that the very first years cultivation of potatoes for that purpose, to the extent of only 25,000 acres, would relieve us from the necessity of any foreign importation, and instead of importing, we should speedily become an exporting country. Potatoes are found to possess such highly nutritive properties, that it seems hardly necessary to enter upon that subject:—They constitute, it is well known, in their natural state, the principal food of the Irish, and they are daily forming a great part of our own. This farina or flour, which contains the substantial nourishing properties of the root deprived of its watery particles, cannot but be highly nutritious;—the use of it therefore in bread, is not likely to be the subject of dispute, provided it is in that state palatable, and can be afforded at a price not exceeding the price of wheaten flour:—That it possesses the first mentioned property, I have only to refer to the bread produced to the Society, containing different proportions of this flour, any, and all of which, will, I believe, be found as wholesome and agreeable as bread made wholly of wheaten flour; in some respects it seems an improvement, as it keeps much longer, and it rises and becomes very light and agreeable when toasted. Upon the second question, I shall be able to shew satisfactorily, that the flour of potatoes can be produced at a cheaper price than the flour of wheat, all objection, therefore, to its use in bread, is not only removed, but I conceive the most important advantages will flow from its adoption. In the specimens before you, one fifth of the farina is the smallest proportion made use of, and two thirds of farina and boiled potatoes together, when in bread, the largest; calculating, however, that no greater proportion than one fifth should be generally introduced, the saving of wheaten flour alone from that circumstance, would be immense. The population of Great Britain consists, according to the latest returns, of upwards of twelve millions and a half, and of this number, it may be conjectured, that, about ten millions consume wheaten bread; each individual's consumption has been considered equal to a quarter of wheat per annum: the introduction of potatoe flour, therefore, generally, would produce a saving of two millions of quarters of wheat per annum, and instead of being, as we now are, an importing nation, we should, after supplying our present deficiency, have a surplus of about 1,500,000 quarters for exportation, which, at the present permitted export price, under 54s. per qr. would be equal in value to four millions sterling! That this surplus would not be obtained without some sacrifice of other crops, I am ready to admit; but when the increased productiveness of the potatoe is considered, when it is calculated, that large tracts of land may be cultivated upon this system, that would not be cultivated upon any other, and that the plan may be generally adopted, which prevails universally in Ireland, and has the recommendation of distinguished agriculturists in this country, of making the potatoe crop precede the crop of wheat, the sacrifices would, upon the whole, be few, and the advantages immense. I know that objections exist, from the scarcity of manure, &c: but I am satisfied that many of them would yield in practice:—The poor Irish contrive to manure the land, and to produce crops that serve to form the winter supply of the city of Dublin, in situations distant from cities, and where artificial manure is not to be had;—lime, sand, sea-weed, are all excellent, and are in many places easily procured; the burning of the surface in rough uncultivated land, is almost sure to produce a large crop, and is generally one of the first, as it is found one of the best preparatives to cultivation: the manure from hogs has been stated to afford very great returns, and, as it is almost essential to the economical pursuit of the business of manufacturing the potatoes into flour, that many hogs should be kept, for the purpose of consuming the skins, refuse, &c. it is a manure that would be abundant in those places, where the manufacture was introduced. Perhaps no situations would so strongly feel the benefit of this system, as those which are remote from sea-ports, and distant from water-carriage: The ground is now necessarily employed in pasture, or it remains waste.

The expense of carriage is an insurmountable bar to the pursuit of agriculture. But let us now consider the situation of a farmer adopting this system; he chuses a remote part of the country, where, perhaps, cultivation did not before exist;—he takes the land, at probably one-fifth part of the rent which he would pay in more frequented spots, and, he either invites the manufacturer of the farina to settle along with him, or he resolves to become a manufacturer himself: the first year, he begins by burning and paring the surface of a part of his land, and by this preparation insures an abundant crop—He sows, the next year, barley or oats on the land, thus cleaned and prepared, which will serve as food for his cattle, and for the large stock of hogs, that, as a manufacturer of farina he must support; and he proceeds to bring a further part of his land under cultivation by the same means—The potatoes are manufactured on the farm, and if he could afford to send the potatoes seven miles to market, in their original state, he can, without disadvantage to himself, convey them fifty in their manufactured state, as they are then reduced to about one-seventh or eighth part of their bulk. His hogs supply him with such a considerable quantity of manure, in addition to that of his farm yard, as will enable him to maintain a constant rotation of potatoe and light corn crops:—His expense in machinery is small, and the waggon that carries his flour to market, brings back his coals, his groceries, and his household requisites, without additional expense. It would be necessary for him to have a considerable number of labourers, and it would be his interest to attract them around him, by allowing them a small portion of land; and by being himself the purchaser of their superfluous produce, he would speedily raise a colony about him, and as the source which gave it life is connected with our subsistence, and the just necessities of our nature, coeval with our wants, its prosperity must be ensured so long as we continue in the disposition to supply them. In the general complaint of the scarcity of farms, and the high rents which lands at present bear, perhaps no speculation offers stronger inducements to the young farmer, who can command a moderate capital, and who is contented to forego some of the gratifications of a large society. If he possesses activity and enterprize, and has engaged his land upon the favourable terms upon which it ought to be had at a distance from market, his success, in a few years, will be certain, provided the system meets with support from the public.

One of its many advantages consists in the incorruptibility of the farina; it is not like the flour of wheat, liable to decay, but it may be preserved for years, sound and good, perhaps improved, but certainly uninjured by age. Thus, our supply will be at all times rendered more equal, and the year of abundance will more effectually contribute to alleviate the year of scarcity:—scarcities themselves are likely to be of less frequent occurrence, as we should have the advantage of two essential crops instead of one; and the weather injurious to wheat, is not unfrequently favourable to the crop of potatoes, and vice versa. I must also observe, that the farina forms an excellent ingredient in sea-biscuit, in the proportions of two parts of farina to three of wheaten flour, or even of three parts farina to four of wheaten flour: a composition of this sort is more likely to resist the effects of climate, from the incorruptible property already mentioned, than if the biscuits were wholly made of wheaten flour.

Such are some of the more leading advantages likely to be produced by the proposed introduction of the flour of potatoes into bread, and the change of system to which it would give rise. We are now perhaps on the eve of another alteration in the Corn Laws, calculated to render the present high prices perpetual. A Committee is sitting upon them, composed of men of landed property, and I have heard, that it is in contemplation to prevent the importation of foreign wheat, when the price of British wheat is under 96*s.* per quarter. This, then, is peculiarly the moment to introduce an alteration in the system, which would render such a measure unnecessary, and which, instead of perpetuating high prices, would produce amongst us all the blessings of plenty. They may be summed up in these words,—We shall have a greater regularity, and a certain reduction of price; an immense increase of consumable food; its more equal distribution through years of scarcity, and years of plenty;

A consequent diminution of the Poors' Rates;

An increase of comforts to the poor, and to all classes of Society, and a great accession to our resources in every branch of national wealth.

J. WHATELY.

April 29th, 1813.

Experiments on Bread.

1*st Experiment.*

No.	Weight		Materials.	Pr.	Amount.		Weight of Bread.		Cost. Per lb.	Observations.
	lb.	oz.		d.	s.	d.	lb.	oz.	d.	
1.	2	8	Flour	5¼	1	1⅛	3	6	3⅞	Good bread.
2.	2	0	Flour	5¼	0	10½	2	11	3⅞	The same.
3.	1	8	Flour	5¼	0	7⅞				
	1	0	Farina	3	0	3				
	2	8			0	10⅞	3	4	3⅜	Raw potatoe flavour.
4.	2	0	Flour	5¼	0	10½				
	1	0	Farina	3	0	3				
	3	0			1	1½	3	13	3½	The same.
5.	1	8	Flour	5¼	0	7⅞				
	2	0	Farina	3	0	6				
	2	0	Boiled Pota.	½	0	1				
	5	8			1	2⅞	5	7	2¾	Slight flavour of the raw potatoe; crust soft.
6.	1	8	Flour	5¼	0	7⅞				
	1	0	Boiled Pota.	½	0	0½				
	2	8			0	8⅜	2	9	3¼	Well tasted bread; moist.
7.	2	0	Flour	5¼	0	10½				
	1	0	Boiled Pota.	½	0	0½				
	3	0			0	11	3	0	3⅝	The same.
8.	1	0	Flour	5¼	0	5¼				
	1	0	Farina	3	0	3				
	1	0	Boiled Pota.	½	0	0½				
	3	0			0	8¾	3	2	2¾	Excellent bread; I consider it fully as satisfying as bread made wholly of wheaten flour.
9.	1	0	Flour	5¼	0	5¼				
	1	0	Boiled Pota.	½	0	0½				
	2	0			0	5¾	1	13	3⅛	Baked heavy, but very sweet bread; moist.

2nd Experiment.

No.	Weight		Materials.	Pr.	Amount.		Weight of Bread.		Cost. Per lb.	Observations.
	lb.	oz.		d.	s.	d.	lb.	oz.	d.	
1.	2	0	Flour	5¼	0	10½				
	1	0	Boiled Pota.	½	0	0½				
	3	0			0	11	2	15½	3¾	Baked heavy, but not unpleasant bread.
2.	1	8	Flour	5¼	0	7⅞				
	2	0	Farina	3	0	6				
	2	0	Boiled Pota.	½	0	1				
	5	8			1	2⅞	5	6	2¾	Baked heavy; indifferent Bread.
3.	2	0	Flour	5¼	0	10½				
	2	0	Farina	3	0	6				
	2	0	Boiled Pota.	½	0	1				
	6	0			1	5½	6	0	2⅞	Excellent bread; improved by being kept a few days, rather overbaked.
4.	1	8	Flour	5¼	0	7⅞				
	1	0	Farina	3	0	3				
	1	0	Boiled Pota.	½	0	0½				
	3	8			0	11⅜	3	5	3½	This proportion is perhaps superior to the last, but the bread of both is excellent; improved by being kept a few days.
5.	1	0	Flour	5¼	0	5¼				
	1	0	Farina	3	0	3				
	1	8	Boiled Pota.	½	0	0¾				
	3	8			0	9	3	3	2⅞	Rather too moist, but very sweet and good, and much improved by keeping.
6.	1	0	Flour	5¼	0	5¼				
	1	0	Rasped Pot.	½	0	0½				
	2	0			0	5¾	1	12	3¼	Light pleasant bread; dark coloured.

3d Experiment.

No.	Weight lb.	Weight oz.	Materials.	Pr. d.	Amount s.	Amount d.	Weight of Bread lb.	Weight of Bread oz.	Cost Per lb. d.	Observations.
1.	2	0	Flour	5¼	0	10½				
	2	0	Farina	3	0	6				
	2	0	Rasped Pot.	0½	0	1				
	6	0			1	5½	6	2	2⅞	Heavy; discoloured; made from potatoes rasped 48 hours; flavor not pleasant.

3d Experiment—(Continued)

No.	Weight lb.	Weight oz.	Materials.	Pr. d.	Amount. s.	Amount. d.	Weight of Bread. lb.	Weight of Bread. oz.	Cost. Per lb. d.	Observations.
2.	2	0	Flour	5¼	0	10½				
	2	0	Farina	3	0	6				
	2	0	Boiled Pota.	½	0	1				
	6	0			1	5½	6	1	2⅞	Heavy.
3.	1	8	Flour	5¼	0	7⅞				
	1	0	Farina	3	0	3				
	1	0	Rasped Pot.	½	0	0½				
	3	8			0	11⅜	3	9	3¼	Rather heavy: discoloured; the boiled potatoes are evidently a more desirable ingredient than the rasped.
4.	1	8	Flour	5¼	0	7⅞				
	1	0	Farina	4	0	3				
	1	0	Boiled Pota.	½	0	0½				
	3	8			0	11⅜	3	5	3½	Good bread; toasts extremely well; indeed all bread made of a proportion of potatoe is remarkably good toasted.
5.	2	0	Flour	5¼	0	10½				
	1	0	Farina	3	0	3				
	1	0	Rasped Pot.	½	0	0½				
	4	0			1	2	4	0	3½	Rather heavy; discoloured; flavour not good.
6.	2	0	Flour	5¼	0	10½				
	1	0	Farina	3	0	3				
	1	0	Boiled Pota.	½	0	0½				
	4	0			1	2	4	0	3½	Excellent bread; superior in colour to No. 4, and rather more compact; this quantity of wheaten flour alone, as appears by No. 7, would have produced 2lb. 10oz. of bread; consequently, the actual proportion of the produce of the potatoe, in this loaf, is 1lb. 6oz., or, as nearly as possible, one third.
7.	2	0	Flour	5¼	0	10½	2	10	4	Rather dark; the appearance of this loaf indicated that the yeast used for this batch was not good.
8.	2	0	Flour	5¼	0	10½	3	4	3¾	Excellent bread; whiter than bread made of wheaten flour alone; no flavour whatever of potatoe; not used untill 9 days old.
	0	8	Farina	3	0	1½				
	2	8			1	0				

3d Experiment—(Continued)

No.	Weight		Materials.	Pr.	Amount.		Weight of Bread.		Cost. Per lb.	Observations.
	lb.	oz.		d.	s.	d.	lb.	oz.	d.	
9.	2	0	Flour	5¼	0	10½				
	0	8	Farina	3	0	1½				
	0	8	Rasped Pot.	½	0	0¼				
	3	0			1	0¼	3	7	3½	Not equal to No. 10, an additional proof that rasped potatoes are not desirable.
10	2	0	Flour	5¼	0	10½				
	0	8	Farina	3	0	1½				
	0	8	Boiled Pot.	½	0	0¼				
	3	0			1	0¼	3	5	3¾	Excellent bread; rises by toasting; and was quite fresh at 7 days old.

From these experiments, it appears that various proportions of potatoes and farina are highly palatable in bread; but if it be calculated that not more than one-fifth part be generally introduced into consumption, the operation of that fifth is sufficiently great to produce all the effects in view, in recommending its general adoption.

Some kinds of potatoes contain a much greater proportion of farina than others, some yielding a seventh part, and even a still larger proportion of it. Experience will best determine the most desirable sort for use, as other kinds produce more abundantly in number, all these considerations should be attended to.

Potatoes may be manufactured into farina during the greater part of the year, but they lose a portion of their farinaceous matter when vegetation begins; the manufacturer, therefore, should provide an early sort to commence his operations upon in August, and cease to grind any after the months of April and May.

Frost-bitten potatoes yield nearly as good farina as the others, provided they are ground before they begin to decay; and potatoes kept over for a whole season, although of inferior value, may, by this process, be still rendered serviceable food for mankind. These are advantages which ought not to escape notice. Frost-bitten potatoes have hitherto become in a short time a total loss, and farmers have generally been afraid of extending their cultivation of potatoes, for fear of their being spoiled by keeping, both which inconveniences are avoided by preparing the farina from them.

Amongst the many important uses to which the farina may be applied, that of biscuit for sea store is of great consequence. Biscuits made from one part farina and two parts of wheaten flour, are whiter and better than those made wholly of common flour. Baked biscuits of these proportions have been repeatedly made with uniform success, and as the farina is in itself less corruptible than wheaten flour, it is likely to produce a biscuit of a less perishable kind. Some have been already kept nearly twelve months without exhibiting any symptoms of moisture or decay; on the contrary, they were as hard and as good as on the day they were baked. Biscuit differs from leavened bread in this circumstance, that all moisture is evaporated from biscuits in baking, whilst it constitutes an essential quality in bread, the weight of bread is greater, the weight of biscuit is less than the flour of which it is composed; it is therefore not inconsistent with the nature of farina that it should exhibit more moisture in bread, and yet discover no symptom of it in biscuit; and it has one convenient property, of which a baker, who manufactures it, may avail himself, that it may be used for bread or biscuit either in a wet or dry state, consequently the expense of drying it may in some cases be avoided. Its introduction into biscuit would produce a saving of one-third of the wheaten flour now used for that purpose, which will be found very great, when the extensive use of biscuit in the navy and army is considered. The farina of potatoes should constitute, from its general application, a part of the stores of each.

In the navy particularly, the farina would afford a great variety of food, as it forms an excellent ingredient in soup as a substitute for pease, oatmeal, and rice, and possesses the superior advantage over those substances, of not being susceptible of injury. One ounce of farina will thicken sufficiently nearly one quart of water: and when this soup is flavoured with onions, cellery, leeks, &c. and seasoned with pepper and salt, it forms a very palatable mixture without the aid of meat. The produce of twenty-one pounds of raw potatoes made into farina, and soup formed from it, will furnish a wholesome meal to twenty-eight persons, allowing each person a full quart, which potatoes, in their original state, would scarcely furnish a dinner to one-third of that number.

The farina of potatoes will form a thick mucilage, with twenty-six times its weight of water.

In all cases where the farina is intended to be converted into a gelatinous state, the farina should be previously mixed with some portion of the liquid cold.

A desert spoonful of the farina mixed with a little cold milk and salt, and added to a pint of boiling milk, and kept stirring and simmering, will form an excellent nutriment.

From various circumstances, it appears that the article called Semolina in the shops, and recommended as a nutritious diet for children and sick persons, is wholly composed of the farina of potatoes.

CERTIFICATES.

Mr. Whately, of Cork, has shewn me a specimen of flour made from potatoes; and also of biscuit, made partly from this flour and partly from the flour of wheat. I am convinced that this flour is very wholesome and very nourishing, and may be of great use to the public in supplying the deficiency of wheaten flour.

M. Baillie, M. D.

Lower Grosvenor-street,
Dec. 11, 1812.

I have examined the flour from potatoes, made by Mr. John Whately, and have no doubt of its containing all the nutritious part of the potatoe, and therefore calculated to form a very good and valuable diet; and as the flour thus produced may be readily transported to any distance, and may be kept for a very long time without losing any of its nutritive properties, I think the conversion of potatoes into flour may prove highly advantageous to the community.

Geo. L. Tuthill.

Soho-square,
Jan. 17, 1813.

Reference to the Engraving of Mr. Whately's Machine for grinding Potatoes. Plate 1. *Fig.* 1, 2.

This machine is of a very simple construction, its moving part consisting of a cylinder covered with tin plates, pierced with holes, so as to leave a rough surface, in the same manner as the graters used for nutmegs, &c. but the holes in this are larger. This cylinder is situated beneath a hopper, into which the potatoes are thrown, and thence admitted into a kind of trough, where they are forced against the cylinder, which, as it revolves, grinds the potatoes to a pulp.

Fig. 1. represents the machine in front, or lengthways of the cylinder; and fig. 2 is a section through the middle of it, shewing also the hopper with its contents, and the manner of the action of the machine. A represents the handle, by which motion is given to the machine: it is fixed upon the end of the axis of the grating cylinder B, on the opposite extremity of this axis is a fly-wheel C, to regulate and equalize the movement; D is the hopper, into which the potatoes are put, and pressing by their weight upon the top of the cylinder, as it it revolves, they are in part grated away. On one side of the lower part of the hopper is an opening, closed or opened more or less at pleasure by a slider E, and the degree of opening which this has regulates the passage of the potatoes from the hopper D into the trough F; this is as wide as the length of the cylinder, and has a concave board G fitted into it, which slides backwards and forwards, by the action of levers *a a* affixed to an axis H, extended across the frame of the machine; K is a lever fixed upon the middle of this axis, and terminating in a hook at the end for the suspension of a weight L; this acts upon the board G by means of the levers K and *a a* and the rods *b*, to force or press the potatoes contained in the trough forwards against the cylinder, and complete the grating of them into a pulp.

A line *c* is tied to the end of the lever K, and passing over a pulley *d*, hangs down within reach of the person who turns the handle of the machine; by drawing this line, the weight at the end of the lever K is raised up, and by the rods *b*, the board G is withdrawn to the extremity of the trough, and a fresh stock of potatoes falls out at the opening E from the hopper into the trough; then the line being let go, the weight L presses the board against the potatoes, and forces them against the cylinder, which by its motion grates them away very rapidly, the pulp passing down the space between the edge of the lower board of the trough F, and the cylinder, which space is only a narrow crevice that nothing may pass down but the reduced pulp, which falls into a box or vessel situated between the frame at M. The board G is perforated with a number of large circular holes, to make an uneven surface, in which the potatoes remain steady, whilst exposed to the action of the cylinder upon their opposite sides.

The tin plate covering the cylinder, is, of course, pierced from the inside outwards, and the bur, or rough edge, left round each, forms an excellent rasping surface, for the reduction of such substances as the present. The frame of the machine requires but little explanation, merely consisting of a square frame, containing the cylinder, and supporting the hopper. This frame stands on four legs, two of which rise up to a sufficient height to carry the pivot of the axis H. The legs are morticed into four ground-sells, which may be made to receive a box or chest, fitted in the manner of a drawer to contain the pulp as it falls from the machine, or it may fall into any vessel placed underneath.

The pulp in the vessels in which it is collected should be completely immersed in water, and well stirred, the separation of the farina, by its falling to the bottom, will speedily take place. The fibrous and refuse parts should be first removed, and the farina afterwards repeatedly washed, until it no longer communicates any tinge to the water: it is then sent to the stove or drying apartment, put into boxes, and dried. Care should, however, be taken, that it does not dry too rapidly. Wherever the business is conducted upon a large scale, a machine for washing the potatoes* should be erected, and it might be contrived to receive motion from the power that directs the grinding machine. The vessels containing the pulp should be so arranged, that a stream of water could be made to pass through them at pleasure. The pulp, after the first separation of the farina still retains a quantity of farinaceous matter; but it will perhaps be more profitable to convert it into food for hogs, with such other additions as may be thought necessary, then to steep it again for the purpose of extracting any remaining portion of farina. It will be probably best to give it to the hogs boiled, along with a moderate proportion of boiled potatoes. This disposal of the refuse pulp would nearly defray the whole expense attendant upon the manufacture of the farina.

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* Models of two machines proper for washing the earth from potatoes, may be seen in the Society's Repository.

⁂ This machine would operate with good effect for reducing apples to a pulp for making cyder, as it is extremely expeditious and effectual in its operation.

The LESSER GOLD MEDAL *of the Society was this Session voted to Mr.* LEONARD PHILLIPPS, *Jun. of the Portsmouth Road, near Vauxhall Turnpike, for Planting upwards of Five Thousand Sorts of hardy Fruit Trees. The following Communications were received from him.*

SIR,

IT will probably be unnecessary for me to enter into a long detail upon the great advantages derivable to this kingdom, from attention to the various fruits it produces, or is capable of producing, particularly the varieties of apples and pears. A reference to the different volumes of the Transactions of the Society of Arts, will shew, that the planting of orchards and improvements of fruit have been long thought deserving of the highest honorary rewards of the Society.

Though sensible of the many difficulties I should have to encounter, yet, I have not been deterred from the attempt of bringing into one point of view, the different varieties of fruit, congenial to this climate, which could be procured from every part of the world to which I could get access, in order to form an establishment, where the public might have an opportunity of viewing all these fruit trees in growth, and, which I have actually so far accomplished, as to have at present above five thousand sorts of fruit trees, in full bearing, at the proper season, in the neighbourhood of Vauxhall.

Much confusion has arisen among horticulturists, from the same kind of apple or pear having different names in different counties. Purchasers of fruit trees have met with great disappointments, in having one sort of apple tree imposed upon them for another, and have hitherto had no means of pleasing their eye or taste, by an opportunity from a morning's walk, to confirm their judgment from actual inspection and comparison.

Many persons are in possession of good fruit trees, of which they do not know the name, or from what quarter similar trees can be procured. A comparison of their fruit with my extensive varieties of trees, will remove that difficulty, and be the means of making the language of the orchardist, clear and general.

I have minuted the original provincial names of the trees I have obtained, and the Horticultural Society of London have appointed a committee, to meet frequently, during the proper season, to examine the different fruits, and to decide upon the proper name to be given to each variety, and thus to form a standard appellation to be generally adopted.

I had the honor, (last autumn), of producing at the

Society's rooms, specimens of above eighty different kinds of apples, with their names, as a sample of the nature of my undertaking, and if I meet with the approbation of the Society, I shall feel a pleasure in annually laying before them, accounts and specimens of the progress I make.

Few can appreciate the difficulties I have encountered in forming my establishment, besides the great expense; and, if I shall be thought deserving of a distinguished mark of honor from the Society, it would be a great stimulus to my further exertion, and might materially encourage the growth of fruit, a branch which, if, by the Society's patronage it should engage the public attention, may be productive of general advantage.

I will furnish the Society, if deemed requisite, with certificates, from competent persons, who have inspected my orchard, and who are convinced of its great utility.

I am, Sir,
Your humble Servant,
LEONARD PHILLIPPS, Jun.

Portsmouth-road, ¼ Mile beyond Vauxhall turnpike,
March 22nd, 1813.

To C. Taylor, M. D. Sec.

Certificates were received from Mr. Robert Culverwell; Mr. Richard Jackson, Belmont Cottage, Wandsworth road; Mr. J. Humble; Mr. James Stonehouse; Mr. John Wisker, and Mess. Chandler and Buckingham, nursery-men, Vauxhall; stating, that they have seen Mr. Leonard Phillipps's plantation of fruit trees, that the trees are in a flourishing state, the varieties very numerous, and collected with much pains and expense, and that they believe this arduous undertaking will be of very great utility to the public.

In Nov. 1813, Mr. Phillipps exhibited to the Society specimens of more than two hundred varieties of apples and pears, produced in his orchard ; he noticed its very favourable, and improved state, and mentioned that persons might depend upon being supplied from him with the real kinds of fruit-trees desired.

⁂ The Society of Arts, &c. would be much obliged to such persons, as have valuable kinds of hardy fruit trees, to furnish them with grafts thereof, at the proper season, with a view to extend their propagation to various parts of the kingdom.

The GOLD MEDAL, *the Premium offered in Class* 10, *for planting the greatest Number of Larches, was this Session adjudged to Mr.* WILLIAM BACKHOUSE, *of Shull House, near Wolsingham, Durham, for planting* 300,000 *Larches, and* 50,000 *other Timber Trees. The following Communication was received from him.*

To the Society for the Encouragement of Arts, Manufactures, and Commerce, Adelphi, London.

GENTLEMEN,

As a candidate for the premium offered for the inclosing and planting the greatest number of acres of land, incapable of being ploughed, in the winter of 1809—10, I here inclose certificates of the plantations I have made, at Shull, near Wolsingham, in the period prescribed by you. They are, with little exception, on the sides of steep hills, in some places rocky, and altogether unfit for cultivation ;

tivation;—the land is very barren, the surface, generally a thin peat, covering a stratum of sand, or sandy clay, the latter of which prevails over the greater part of the estate. Under this earth, broken yellow sand-stone, from one foot to a yard or two, in depth, keeps the land remarkably dry; and it appears a soil well suited for the cultivation of larch. The ling was first burnt off the land, which was all holed, and the holes made at least six months before the trees were planted, which appeared to assist them considerably the first year, as the soil had, by exposure to the air, become fine and mellow, and in good condition to receive the plants; the holes were from 9 to 12 inches diameter, and on an average 9 inches deep; the plants had been one year transplanted, and were from 10 to 18 inches high when set, the spruce firs excepted, which had been two years transplanted. The larches are now from 2 to 3½ feet high, and growing remarkably well.

The estate is distinct, although adjoining to one of the same name, planted by my brother, Jonathan Backhouse, Jun.

WILLIAM BACKHOUSE.

Total number of forest-trees planted by me, Three hundred and fifty thousand; (particulars, as under) planted on about one hundred and thirty one acres.

2500 larches per acre;
400 scotch, and spruce fir, and oak, per acre,

2900 trees, per acre.

CERTIFICATES.

I hereby certify, that I have superintended the inclosing and planting of one hundred and thirty acres of land, *incapable* of being ploughed, from its being too hilly and rocky, and of a soil too barren to repay the expense of tillage, on the estate of Wm. Backhouse, at Shull, in the parish of Bedbourn, and for his account. The said plantations are effectually inclosed and secured, and in a thriving condition, being from 2 feet to 3½ feet in heighth, and containing three hundred and fifty thousand forest trees.

Witness my hand this 14th day of December, 1812,

JAMES THOMPSON.

Total.		*The Particulars.*	
300,000	- -	2,500	larches, per acre.
50,000	- -	400	of Scotch and spruce fir, and oak, and a few birch and alder in bogs.
350,000	- -	2,900	per acre.

JOHN ATKINSON,

I have surveyed the estate within mentioned, which has been completely planted with larches, oak, spruce, and Scotch fir, birches, alders, &c. at the distance of five feet by three;—and the plants are in a thriving condition, the whole well-fenced, and the soil and situation render it incapable of being otherwise useful.

As witness my hand, this 12th day of December, 1812,

EDWARD CHARLTON;
West Auckland.

131 A. 0 R. 20 P.

Witness,
JOHN ATKINSON.

I have looked over the within mentioned plantations at Shull, and am of opinion, the ground is so barren as not to repay the expense of tillage, and that the within statement is correct, the fences being in good order, and the trees growing vigourously *at this time.*

Witness my hand, this 15th day of 12th month, 1812,

GEORGE COATES,
Land-agent to David Bevan, Esq.
Banker, Lombard Street.

The SILVER MEDAL, *the Premium offered in Class* 11, *for Planting Larches, was this Session adjudged to Mr.* JONATHAN BACKHOUSE, *Jun. of Darlington, Durham, for planting* 271,000 *Larches, and from whom the following Communications were received.*

As a candidate for the premium offered by you for the planting the greatest number of larches in the winter 1809—10, I enclose certificates of plantations made by me within the period prescribed, at Shull, in the parish of Bedburn, where I have planted, 168,300 larches, and, at Sheep Walk, (Lanchester,) where, 102,800 larches have been planted, making, in the whole, *two hundred and seventy-one thousand one hundred larches,* planted by me, in the course of that season. These plantations have been chiefly made upon lands, that have been inclosed about twenty years, but never cultivated, and were covered with ling or heath, about 20 acres of it had been in cultivation at some period, but had been long abandoned, and, for many years, produced nothing but ling: about seven acres of it were in ploughing at the time that it was planted: I merely mention this to observe, that where the land had been in cultivation, (though, many years ago, that the trees have invariably grown with greater vigour, and are now about one foot higher than those planted on lands, which had never been broken up.—The nature of the soil, on both estates, is much the same, being chiefly a sand, or sandy clay, covered with about an inch of black peat earth, (where it had not been ploughed,) and the substratum, a sand stone. From experience I find, that larches do not thrive in peat earth, even when dry; or, where the surface only is peat, it retards their growth, but by ploughing it becomes mixed with other earths, and also drains the land more completely: the growth of the trees is, in consequence, much more uniformly healthy and vigorous, than on those soils which have never been broken up. At Shull, the land is generally hilly; at Sheep-walk, it is a gradual slope to the south east. Where the land is level, ploughing is more obviously beneficial, as it takes off the surface water, which I have always found to injure the growth of the larches: the trees were planted 3 feet by 5, 2500 larches per acre, and 400 of oak, spruce, and Scotch fir; the land was holed in the autumn, the surface of ling, &c. being first taken off with a paring spade, where the holes were made, excepting on the ploughed land, which was done more slightly.

I am, respectfully,

JON. BACKHOUSE, JUN.

Darlington, December 21st, 1812.

TO THE SOCIETY OF ARTS, &c.

The larches had been transplanted from the seed bed one year before they were set out, and were from 10 to 15 inches high; and I have invariably found, that trees of this age and size succeed the best.

This estate at Shull is distinct from, though adjoining the one planted by my brother, William Backhouse; that of Sheep-walk adjoins the estate of T. White, of Woodlands.

J. B. Jun.

CERTIFICATES.

I do hereby certify, that I have superintended the planting of one hundred and two thousand eight hundred larch trees on the property of Jonathan Backhouse, Jun. of Darlington, at Sheep-walk, in the parish of Lanchester, and county of Durham, by his order, and on his behalf, the said trees were all planted between the 24th of June, one thousand eight hundred and nine, and the 24th of June, one thousand eight hundred and ten, and cover nearly forty acres of land, not well calculated for husbandry: the said plantations are effectually fenced and secured, and the plants are in a most thriving condition, being from 2 feet to 3½ feet high.

Witness my hand, this 12th day of December, 1812,

THOMAS PARKER, his mark ✕.
Witness, WILLIAM SNOWBALL.

I do hereby certify, that I surveyed the within mentioned estate, which is completely planted with larches, (a few spruce firs excepted), at the distance of five feet by three feet from each other, and that the within report of their thriving condition, growth, and fences, is true.

Witness my hand, this 14th day of December, 1812,

EDWARD CHARLTON.
West Auckland.

Witness, JOHN ATKINSON.

I have looked over the within mentioned plantations, at Sheep-walk, and am satisfied, that the statement is correct, the fences being in good order, and the trees healthy, and growing well.

Witness my hand, this 11th day of December, 1812,

ROBERT HUNTER,
Agent for Thomas White, Esq. of Woodlands.

I have looked over the within mentioned plantations at Sheep-walk—I am satisfied that the statement is correct, the fences being now in good condition, and the trees growing with vigour.

Witness my hand, this 21st day of December, 1812,

GEORGE COATES.

The larches have grown, on an average, as under,

First year, about	3 inches.
Second do.	-	6 to 12.
Third do.	-	9 to 18.

Shull House, December 14th, 1812,
near Wolsingham.

I do hereby certify, that I have superintended the planting of one hundred and sixty eight thousand three hundred larch trees, between the 24th of June, 1809, and the 24th of June, 1810, on behalf of Jonathan Backhouse, Jun. of Darlington, in the county of Durham, at Shull, in the parish of Redbourn, in the said county, on lands not calculated for the purposes of husbandry: the said plantations cover 67 acres of land, are effectually fenced and secured, and the plants are in a thriving condition, being about 2½ feet in height.

Witness my hand, this 14th day of December, 1812,

JAMES THOMPSON.

Witness, JOHN ATKINSON.

The Thanks of the Society were this Session voted to Mr. RICHARD GREEN, *No.* 8, *Lisle Street, Leicester Square, for his Present of Two Instruments for cutting or scooping out the Eyes of Potatoes for Sets or Plants. The following Communication was received from him, an explanatory Engraving is annexed, and the Instruments are preserved in the Society's Repository.*

GENTLEMEN,

I HAVE herewith submitted for your inspection, two machines, or instruments, for cutting potatoes, for sets, or seed, they are of a simple construction, differing a little from each other. Their advantages are ease and facility in cutting, and a certainty of the cuttings or sets being of

PL.2.

Mr. G. Hughes's Moveable Scaffold, for repairing the interior of a Dome &c.

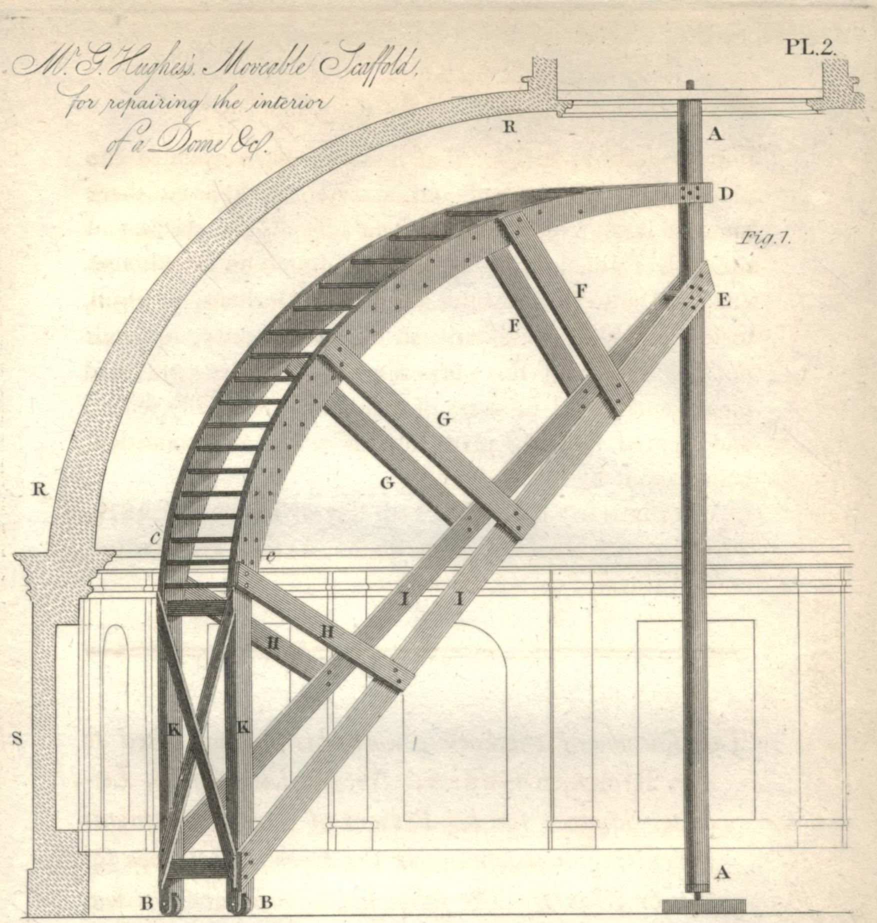

Fig.1.

Mr. Richd. Green's Potatoe Scoops.

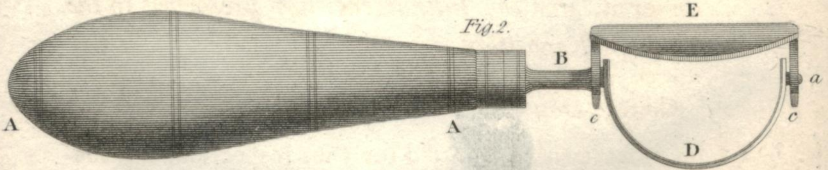

Fig.2.

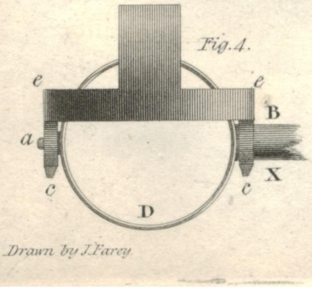

Fig.4.

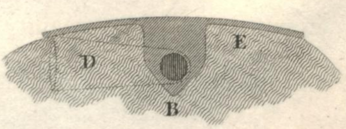

Fig.3.

Drawn by J. Farey.

Engraved by Jas. Davis.

of a proper size, which is a matter I respectfully recommend to your notice.

The sets will be all about an inch in diameter, and can be planted by a bean-barrow, or drill-machine, with one third of the labour, and with more accuracy than by hand. A boy and one horse will be sufficient to plant with such sets an acre in a day.

I remain,
Gentlemen,
Your most obedient, humble Servant,
RICHARD GREEN,
Ironmonger.

No. 8, Lisle-street,
Leicester-square.

To the Society of Arts, &c.

Reference to the Engraving of Mr. Richard Green's Potatoe Scoops, Plate II.—*Fig.* 2. 3. 4.

A A, Fig. 2, represents the handle of the machine, nearly of its proper size, B the shank inserted into the handle united to the semicircular cutter or knife, D, which is sharp at both edges, and turns on pivots at B and *a* in E, a brass plate, which, by means of ears or projections from it downwards, at *cc*, allows the knife D, when a potatoe is held firm in the left hand, and the plate E pressed down hard upon it with the left thumb to cut from it a semicircular solid piece, or set, by turning the handle with the right hand, and forcing the knife through it in a semicircular direction.

Fig. 3, shows an end view of the brass plate, its ears, and steel cutter, supposed to have been pressed into a potatoe ; D a section of the steel cutter, and B the end of one of the pivots on which the cutter turns.

Fig. 4 shows another machine, for the same purpose, in which X is part of the handle. D, the cutter, which is here a perfect circle. *e e*, a brass ring, in the lower projections from which the cutter turns upon pivots, at *a* B, making a complete revolution in turning round the handle. E, an arched brass-piece, rising from the brass ring *e e*, on which the pressure with the thumb of the left hand is to be made, as in the other instrument.

The only attention necessary in the use of either instrument is, to place it so upon the potatoe, that the eye, or part from whence the shoot springs, is nearly in the centre of the piece to be cut out to set.

The GOLD MEDAL, *the Premium offered in Class 21, was this Session adjudged to Mr.* EDWARD KNIGHT, *of Great Bardfield, Essex, for the growth of a Crop of Beans, and sowing Wheat on the same Land, the same Year, and thus preventing the necessity of a Fallow. The following Communication was received from him.*

To the Society for the Encouragement of Arts, Manufactures and Commerce.

ON perusing the Premiums offered by the Society, I observe one for the greatest number of acres of beans and wheat;—I beg leave, therefore, to mention, that in the beginning of 3d Mo. (March) 1812, I sowed fifteen acres of Beans, with a hand drill, about 7½ acres Tick beans, and the remainder with a small purple bean, and hoed the rows three times, and ploughed betwixt the rows, (being about two feet eight inches asunder), four times with a common foot plough, and two horses. Being a very wet season, I could not, as my common practice is, hoe the land after the beans got too high to plough, but when they reaped the beans, (from the 16th of 9 Mo. to 21st), I set up the shocks so as to plough between them, directly with a slice plough, and furrowed up with a common plough, being on four furrow ridges, and then moved the shocks of beans on the land so dressed, and worked the rest in the same manner; by which method, and harrowing up the weeds, I made my land in good order for wheat, which was sown the latter end of 10 Mo. (October,) 1812, and have now a good plant of wheat, by the before-mentioned method of sowing beans and ploughing betwixt the rows. In a good season I get my land as clean as a good summer fallow, and grow a fair average crop of beans; for our poor land, say four quarters per acre, but this year a poor crop of beans in general; I do not expect more than three quarters per acre, but I have not yet thrashed all my beans, when I have, I will give the quantity. The land is a wet heavy soil, not rich. I have hollow-drained it four times within about thirty years, twice with the spade, and twice with a Mole plough. A man will drill four acres in a day, before the ploughs, when it does well, and I sow two furrows on a ridge, or more, on a broad land; I fix the same drill behind a common plough, and drill either beans or pease very regular. The beans cost 3*s.* per acre hoeing, each time, and the ploughing 4*s.* each ploughing.

EDWARD KNIGHT.

Great Bardfield, 2 Mo. 22nd, 1813.

These are to certify, that our master, Edward Knight, sowed the fifteen acres of beans and wheat, and worked the land as before described.

Witness our hands this 22d of Feb. 1813.

John Shakeshaft,
Thomas Shakeshaft, his mark ×.

This is to certify, that the communication to the Society of Arts, &c. by Edward Knight, of Bluegate Hall, Great Bardfield, respecting his growth of beans, that 15 acres were sown with a hand-drill, and ploughed between four times, and hoed three times in the rows, in the spring, 1812, and that the same land is now sown with wheat, and is in good plant, is a true statement.

Witness Thomas Stebbing,
Thomas Pollett,
William Pollett.

Bardfield, April 14th, 1813.

The quantity or beans, per acre, cannot yet be ascertained, as they are not all thrashed.

Ten Guineas, *the Premium offered in Class 27, were this Session adjudged to Mr.* **Edward Knight**, *of Great Bardfield, Essex, for Twenty-one Stocks of Bees, in his possession. The following Communication was received from him.*

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

Seeing among the Premiums for this year, one for the greatest number of Hives or Boxes, stocked with Bees, I beg leave to inform the Society, agreeably to their offer, that I had, previous to the 21st of 8 Mo. (September,) 1812, twenty-one stocks of bees, which the undersigned have witnessed. Should I be so fortunate as to obtain the Society's Premium, I shall feel much obliged.

Your friend,

EDWARD KNIGHT.

Great Bardfield, Essex,
10 *Mo.* 10*th*, 1812.

We, the undersigned, do hereby certify, that we have seen the 21 stocks of bees, in the possession of Edward Knight, as stated above, and that they have been in his possession during the summer.

John Shakeshaft,
Charlotte Day.

OBSERVING, that it is expected, that the claimant should give such information as may occur respecting bees, I have one observation to make, viz. That I have found it better, after the month (called) June, when the bees lay out of the hive, and do not soon swarm, to make an addition to the hive, as, if they have room, they will not lay out nor swarm. This is done by working a piece of the same sort and size of the skip or hive, with a hoop on the top; then raise up the hive, and put this under, first putting some soft clay on the top of the piece, to make it air-tight;—by this way I might call my stocks twenty-three, having two double ones. Or, otherwise, I have put a box under the hive, with a hole cut in the top, near as large as the hive, and set the hive on it; by this method we took, from one hive, 45lbs. of honey, and 14½lbs. of wax.

EDWARD KNIGHT.

Great Bardfield, 10 *Mo.* 10*th*, 1812.

CERTIFICATES were received from Mr. THOMAS STEBBING, Mr. THOMAS POLLETT, and Mr. WILLIAM POLLETT, stating, that it appeared to them, from the testimony of John Shakeshaft, servant to Mr. Edward Knight, that the above statement is correct.